



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/705,347	11/08/2003	Catherine B. Labelle	0180151	4624

25700 7590 12/07/2005

FARJAMI & FARJAMI LLP  
26522 LA ALAMEDA AVENUE, SUITE 360  
MISSION VIEJO, CA 92691

EXAMINER
----------

CHEN, KIN-CHAN

ART UNIT	PAPER NUMBER
----------	--------------

1765

DATE MAILED: 12/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/705,347	Applicant(s) LABELLE ET AL.	
	Examiner Kin-Chan Chen	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 November 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,6-8,14-16,19 and 20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,6-8,14-16,19 and 20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                         |                                                                             |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                                |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____                                                             | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 6-8, 14-16, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Colombo (US 2005/0079696) in view of Alers et al. (US 6,265,260) or Tu et al. (US 6,566,250) as evidenced by Chang et al. (2004/0188240; [0040]) or Ballance et al. (US 6,090,210; col. 1, lines 32-35), or Aronowitz et al. (US 6,759,337; col. 2, lines 45-50) or Chang et al. (US 2005/0019964; [0041]).

In a method for forming a MOS FET on a substrate, Colombo teaches that a high-k dielectric layer may be situated over the substrate. A gate electrode layer (such as polysilicon) may be thereon. The gate electrode layer and high-k dielectric layer may be etched to form a gate stack. A nitridation process may be performed on the gate stack. Colombo teaches various high-k dielectric materials, reading on instant claims. See abstract; Fig.4; [0010] [0012] [0025] [0029].

As to claim 15, Colombo teaches nitridation may be accomplished by any suitable techniques [0011]. Hence, it would have been obvious to one with ordinary

Art Unit: 1765

skilled in the art to use the conventional nitridation method of applying plasma comprising nitrogen. Alers et al. (US 6,265,260; col. 3, lines 41-43) or Tu et al. (US 6,566,250; col.6, lines 7-9) is only relied on to show the conventional nitridation method of applying plasma comprising nitrogen. Because it is a conventional method in the art of semiconductor device fabrication and because it is disclosed by Alers, Tu, hence, it would have been obvious to one with ordinary skilled in the art to apply said nitridation method in the process of Colombo in order to efficiently carry out the nitridation process.

As to claim 16, the prior art teaches the limitation because the same nitridation is performed on the gate stack, it is expected that the method of the prior art would contain the same properties and effects (nitrogen forming an oxygen diffusion barrier in the high-k dielectric segment).

Claims differ from prior art by specifying performing the nitridation and etching in the same process chamber. However, It is common in the art that the plasma process chamber may be used for performing both etching and nitridation because it is efficient and more cost effective. See Chang et al. (2004/0188240) or Ballance et al. (US 6,090,210), or Aronowitz et al. (US 6,759,337) or Chang et al. (US 2005/0019964) in the record as evidence.

3. Claims 1, 6-8, 14-16, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doyle et al. (US 5,891,798) in view of Alers et al. (US 6,265,260) or Tu et al. (US 6,566,250) as evidenced by Chang et al. (2004/0188240; [0040]) or

Art Unit: 1765

Ballance et al. (US 6,090,210; col. 1, lines 32-35), or Aronowitz et al. (US 6,759,337; col. 2, lines 45-50) or Chang et al. (US 2005/0019964; [0041]).

In a method for forming a MOS FET on a substrate, Doyle teaches that a high-k dielectric layer may be situated over the substrate. A gate electrode layer (such as polysilicon) may be thereon. The gate electrode layer and high-k dielectric layer may be etched to form a gate stack. A nitridation process may be performed on the gate stack. See abstract; col. 4 and col. 5.

As to claim 15, Doyle teaches nitridation may be accomplished by any suitable techniques [0011]. Hence, it would have been obvious to one with ordinary skill in the art to use the conventional nitridation method of applying plasma comprising nitrogen. Alers et al. (US 6,265,260; col. 3, lines 41-43) or Tu et al. (US 6,566,250; col. 6, lines 7-9) is only relied on to show the conventional nitridation method of applying plasma comprising nitrogen. Because it is a conventional method in the art of semiconductor device fabrication and because it is disclosed by Alers, Tu, hence, it would have been obvious to one with ordinary skill in the art to apply said nitridation method in the process of Doyle in order to efficiently carry out the nitridation process.

As to claims 6 and 19, Doyle (col. 4, line 2) teaches that any such high dielectric constant material can be used, making the claimed limitation obvious because the claimed high dielectric constant materials are commonly used in the art of semiconductor device fabrication.

Art Unit: 1765

As to claim 16, the prior art teaches the limitation because the same nitridation is performed on the gate stack, it is expected that the method of the prior art would contain the same properties and effects (nitrogen forming an oxygen diffusion barrier in the high-k dielectric segment).

Claims differ from prior art by specifying performing the nitridation and etching in the same process chamber. However, It is common in the art that the plasma process chamber may be used for performing both etching and nitridation because it is efficient and more cost effective. See Chang et al. (2004/0188240) or Ballance et al. (US 6,090,210), or Aronowitz et al. (US 6,759,337) or Chang et al. (US 2005/0019964) in the record as evidence.

### ***Response to Arguments***

4. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Chang et al. (2004/0188240; [0040]) or Ballance et al. (US 6,090,210; col. 1, lines 32-35), or Aronowitz et al. (US 6,759,337; col. 2, lines 45-50) or Chang et al. (US 2005/0019964; [0041]) teaches that the plasma process chamber may be used for performing both etching and nitridation.

Art Unit: 1765

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (571) 272-1461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For

Art Unit: 1765

more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*December 5, 2005*

A handwritten signature in black ink, appearing to read 'K. C. Chen', with a stylized flourish extending from the end.

Kin-Chan Chen  
Primary Examiner  
Art Unit 1765